



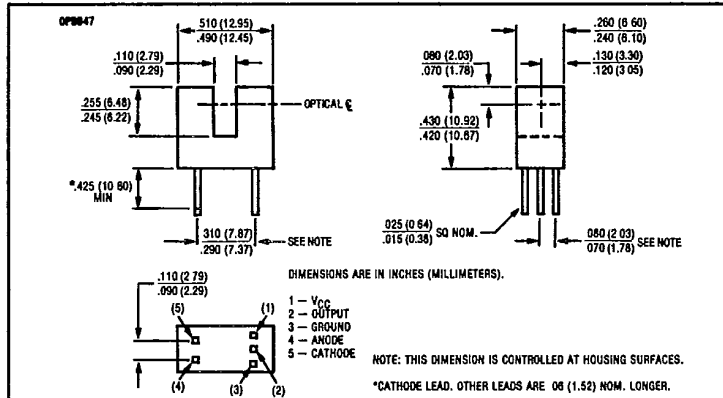
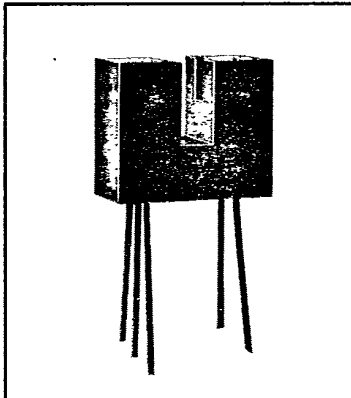
Optoelectronics Division  
TRW Electronic Components Group

Product Bulletin 5358  
January 1985

T-41-73

# Photologic™ Slotted Switches

## Types OPB947, OPB948



### Features

- Two output options
- Low cost plastic housing
- Direct TTL/LSTTL interface
- High noise immunity
- Data rates to 250 Kbaud

### Description

The OPB947 and OPB948 each contain an infrared emitting diode coupled to a monolithic integrated circuit, which incorporates a photodiode, a linear amplifier and a Schmitt trigger on a single silicon chip. The devices feature TTL/LSTTL compatible logic level output which can drive up to 8 TTL loads directly without additional circuitry. Also featured are medium speed data rates to 250 Kbaud with typical output rise and fall times of 25 nsec. A 0.025 inch (0.635 mm) aperture in front of the sensor and a 0.05 inch (1.27 mm) aperture in front of the LED allows high resolution motion sensing. The devices are encased in low cost plastic housings which reduce ambient light noise and ease direct soldering to PC boards.

OPB947 and OPB948 each utilize an OP140 or OP240 LED. OPB947 uses an OPL550 type sensor and OPB948 uses an OPL550-OC type sensor.

### Absolute Maximum Ratings (T<sub>A</sub> = 25°C unless otherwise noted)

Supply Voltage, V <sub>CC</sub> (not to exceed 3 seconds)	+10.0 V
Storage Temperature Range	-40°C to +85°C
Operating Temperature Range	-40°C to +70°C
Lead Soldering Temperature Range (1/16 inch [1.6 mm] from Case for 5 sec. with soldering iron)	240°C <sup>(1)</sup>
Total Power Dissipation	300 mW <sup>(2)</sup>
Input Diode Power Dissipation	100 mW <sup>(3)</sup>
Output Photologic Power Dissipation	200 mW <sup>(4)</sup>
Duration of Output Short to V <sub>CC</sub> or Ground (OPB947)	1.00 sec.
Duration of Output Short to V <sub>CC</sub> (OPB948)	1.00 sec.
Voltage at Output Lead (OPB948)	35 V
Input Diode Forward DC Current	40 mA
Input Diode Reverse DC Voltage	2.0 V

### Notes:

- (1) RMA flux is recommended. Duration can be extended to 10 seconds max. when flow soldering.
- (2) Derate linearly 4.0 mW/°C above 25°C.
- (3) Derate linearly 1.33 mW/°C above 25°C.
- (4) Derate linearly 2.87 mW/°C above 25°C.
- (5) Normal application would be with light source blocked, simulated by I<sub>f</sub> = 0.
- (6) Methanol and isopropanol alcohols are recommended as cleaning agents.

Types **OPB947, OPB948**

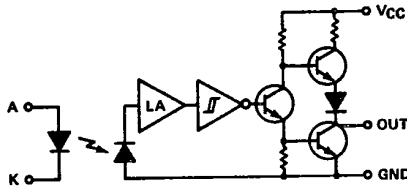
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Electrical Characteristics (T<sub>A</sub> = -40° to +70°C unless otherwise noted)

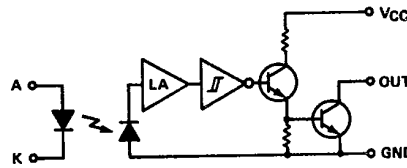
Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
<b>Diode Input</b>						
V <sub>F</sub>	Forward Voltage			1.70	V	I <sub>F</sub> = 20 mA, T <sub>A</sub> = 25°C
I <sub>R</sub>	Reverse Current			100	μA	V <sub>R</sub> = 2.0 V, T <sub>A</sub> = 25°C
I <sub>F(+)</sub>	LED Positive-Going Threshold Current			15.0	mA	V <sub>CC</sub> = 5.0 V, T <sub>A</sub> = 25°C
I <sub>F(+)</sub> - I <sub>F(-)</sub>	Hysteresis Ratio		2.0			
<b>Photologic Output</b>						
V <sub>CC</sub>	Operating Supply Voltage	4.75		5.25	V	
I <sub>CC</sub>	Supply Current			15.0	mA	V <sub>CC</sub> = 5.25 V, I <sub>F</sub> = 0 <sup>(6)</sup> or 15.0 mA
<b>OPB947 (Buffer, Totem-Pole)</b>						
V <sub>OL</sub>	Low Level Output Voltage			0.40	V	V <sub>CC</sub> = 4.75 V, I <sub>OL</sub> = 12.8 mA, I <sub>F</sub> = 0 mA <sup>(6)</sup>
V <sub>OH</sub>	High Level Output Voltage	2.4			V	V <sub>CC</sub> = 4.75 V, I <sub>OH</sub> = -800 μA, I <sub>F</sub> = 15.0 mA
I <sub>OS</sub>	Short Circuit Output Current	-30		-100	mA	V <sub>CC</sub> = 5.25 V, I <sub>F</sub> = 15.0 mA, Output = GND
<b>OPB948 (Buffer, Open Collector)</b>						
V <sub>OL</sub>	Low Level Output Voltage			0.40	V	V <sub>CC</sub> = 4.75 V, I <sub>OL</sub> = 12.8 mA, I <sub>F</sub> = 0 mA <sup>(6)</sup>
I <sub>OH</sub>	High Level Output Current			100	μA	V <sub>CC</sub> = 4.75 V, V <sub>OH</sub> = 30 V, I <sub>F</sub> = 15.0 mA
<b>OPB947 (Buffer, Totem-Pole)</b>						
t <sub>r</sub> , t <sub>f</sub>	Output Rise Time, Output Fall Time		70		ns	V <sub>CC</sub> = 5.0 V, T <sub>A</sub> = 25°C, I <sub>F</sub> = 0 <sup>(6)</sup> or 20 mA
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay, Low-High, High-Low		5.0		μs	f = 10.0 kHz, D.C. = 50%, R <sub>L</sub> = 8 TTL Loads
<b>OPB948 (Buffer, Open Collector)</b>						
t <sub>r</sub> , t <sub>f</sub>	Output Rise Time, Output Fall Time		70		ns	V <sub>CC</sub> = 5.0 V, T <sub>A</sub> = 25°C, I <sub>F</sub> = 0 <sup>(6)</sup> or 20 mA
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay, Low-High, High-Low		5.0		μs	f = 10.0 kHz, D.C. = 50%, R <sub>L</sub> = 8 TTL Loads

Schematics

OPB947 (Totem-Pole Output) Buffer



OPB948 (Open Collector Output) Buffer

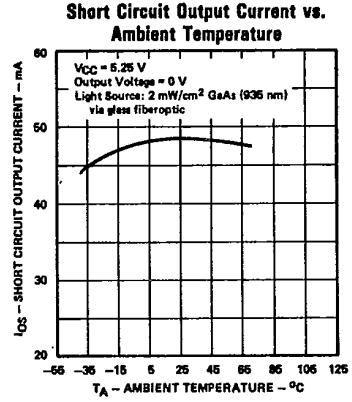
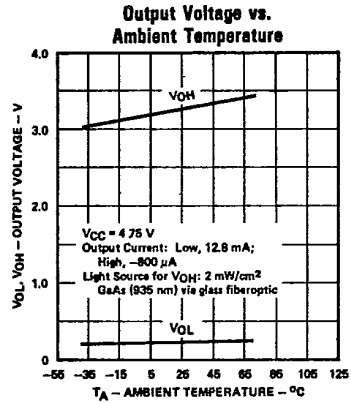


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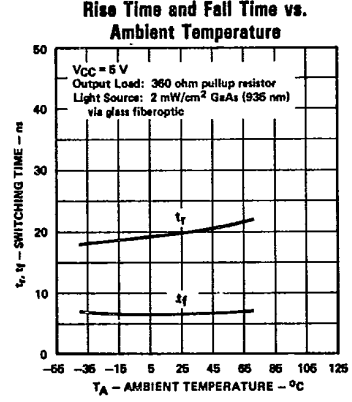
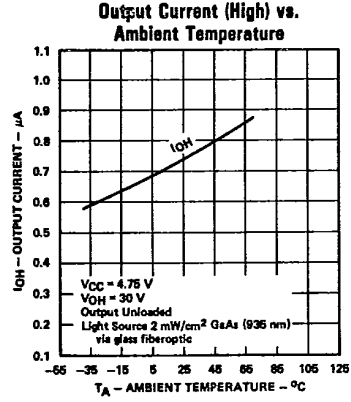
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Typical Performance Curves

OPB947



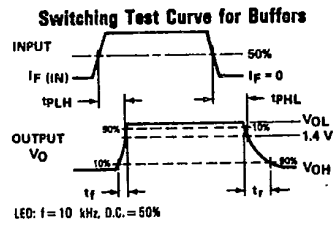
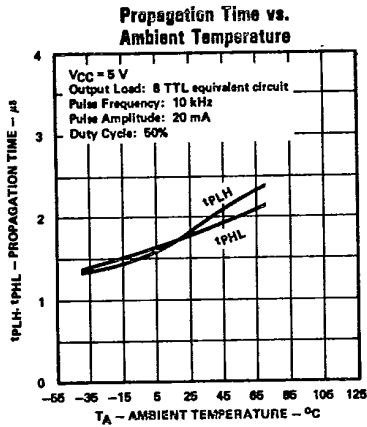
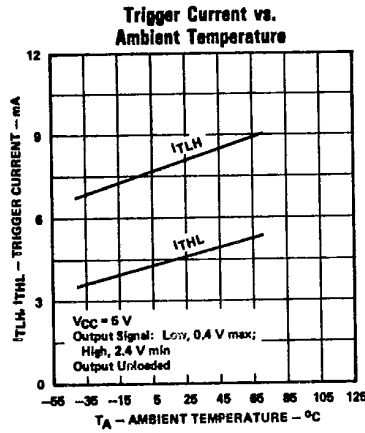
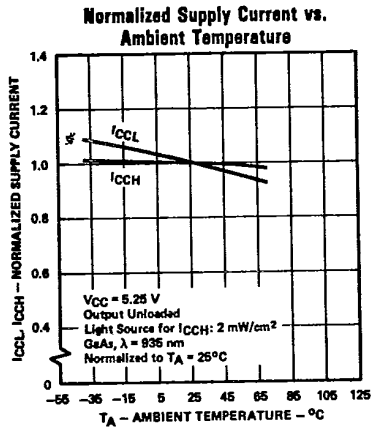
OPB948



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Typical Performance Curves



TRW reserves the right to make changes at any time in order to improve design and to supply the best product possible.  
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